HRF MARES RACK UIP/UOP POWER INTERFACE BOARD DERATING ANALYSIS SUMMARY

ISS EEE Parts has reviewed the derating analysis of the HRF Mares Rack UIP/UOP power interface rack. The analysis included a look at the following hardware:

a. Filter board assembly switch board SIG46119521
b. Switch Board assembly SDG46119516
c. Control Board Assembly SEG46119522

SUMMARY: We have responded to each board separately below in paragraphs A-C. Our overall conclusion is that no non-compliances were found except for several fuses that do not meet the 50 percent derating. The project agreed to increase several fuse sizes to decrease the risk of a nuisance trip. Even with those increases, most of the fuses still do not meet the 50 percent derating requirement. EV5 recommends taking exception to the 50 percent because we see enough guardband to protect against an unintended trip.

One issue that is of concern is the use of a 10 amp SSCB protecting the overall system. I am told that a future application of this hardware will allow a maximum of 9 amp nominal current. The present use of the hardware has a 5 amp nominal current maximum and the 10 amp SSCB is sized correctly for that application. The recommendations to increase several fuse sizes do not force the wire current to exceed the derating limits in a smart short event. The review findings are listed below.

A. Derating analysis assessment of Filter Board, SIG46119521

1. 12 amp fuse issue in Utility Output Panel (UOP) derating violation: A 12A (F03B, P/N 326012, slow blow fuse). The fuse is used between the input power source (12A current limit RPCM-V) and the Power Interface Panel (PIP). The PIP is a Solid State Circuit Breaker (SSCB) used to protect 16 AWG wire. The SSCB is designed to guarantee to trip in 19 msec at 10A, and current limit at 12A, and the worst-case fault shut down at 16A.

   The derating analysis of the filter board showed that the 12A fuse did not meet the 50 percent derating requirement of SSP30312. Analysis showed nominal current through the fuse is 9A. The 9A nominal current against a 12A rating increases the probability for a nuisance trip.
   Finding: Use a 15A fuse that will assure against a nuisance trip. The 15 amp value still does not meet the 50 percent derating requirement. EEE Parts recommends you not meet the mindless 50 percent requirement. The critical factors are protecting the wire in a smart short event and assuring there is no safety concern with potentially increasing the risk of a nuisance trip. This non-compliance will need to be documented in the derating analysis .

2. 15 amp fuse in Utility Interface Panel (UIP): A15 amp fuse is used between PIP and the input power source to protect 12 AWG wire. The PIP consists of an SSCB (identical in design used in UOP) to protect 12 AWG wire. The derating analysis of the filter board showed that the nominal current through the 15 amp fuse was 9 amps, exceeding the 7.5 amp derated requirement current.
   Finding: This fuse is redundant to the SSCB which trips at 10 amps and although it doesn't meet the 50 percent derating requirement, EV5 recommends it not be changed because there is sufficient margin between the 9 amp nominal current and the 15 amp rating. All other components on this board meet the SSP30312 derating requirements.

B. Derating analysis assessment of Switch Board, SDG46119516.
The derating analysis of switchboard revealed two Pico II fuses (Part Number 251007) exceeded the current derating limit. These fuses are rated at 7 amp. Analysis showed that the nominal current through these fuses is 5 amps, which fails the SSP 30312 derating requirements.
Findings: Our recommendation was to replace the fuse with a 10 amp fuse. The design engineer has agreed to follow our recommendation. All other components on this board meet the SSP30312 derating requirements.

C. Derating analysis assessment of Control Board, SEG46119522.
Findings: All components on this board meet the SSP30312 derating requirements.

Mac Rao
ISS EEE Parts,
Phone: 281-483-5456.